

CLAIMS

What is claimed is:

1. A radio receiver for a Frequency Modulation (FM) band signals, comprising:

a hybrid/all digital decoder that acquires synchronization and decodes said FM band signals to generate digital audio signals; and

an analog FM demodulator that demodulates said FM band signals to generate analog audio signals,

wherein said analog FM demodulator generates said analog audio signals while said hybrid/all digital decoder simultaneously attempts to acquire synchronization, and wherein said radio receiver outputs said analog audio signals until said synchronization is acquired.

2. The radio receiver of Claim 1 further comprising an RF front end that receives said FM band signals.

3. The radio receiver of Claim 2 further comprising an analog to digital (A/D) converter that converts said FM band signals from said RF front end to digital signals.

4. The radio receiver of Claim 3 wherein said analog FM demodulator communicates with an output of said A/D converter.

5. The radio receiver of Claim 2 wherein said analog FM demodulator communicates with an output of said RF front end.

6. The radio receiver of Claim 3 further comprising:

- a system selector that generates selecting signals;
- an audio decoding and blending circuit that communicates with said hybrid/all digital decoder and said analog FM demodulator; and
- a multiplexer that selects one of an output of said audio decoding and blending circuit and an output of said analog FM demodulator and that is controlled by said system selector.

7. The radio receiver of Claim 6 further comprising:

- a first switch that is arranged between said A/D converter and said hybrid/all digital decoder; and
- a second switch that is arranged between said analog FM demodulator and said A/D converter,

wherein said system selector controls said first and second switches.

8. The radio receiver of Claim 1 wherein said hybrid/all digital decoder comprises:

a time/frequency synchronizer;

a Discrete Fourier Transformer (DFT) that communicates with an output of said time/frequency synchronizer;

a demodulator that demodulates an output of said DFT;

a deinterleaver that deinterleaves an output of said demodulator;

a channel code decoder that decodes an output of said deinterleaver; and

a descrambler that reorders bits of an output of said channel code decoder.

9. The radio receiver of Claim 8 further comprising an extract controller that determines when synchronization is acquired and that controls at least one of said DFT, said demodulator, said deinterleaver, said channel code decoder and said descrambler.

10. The radio receiver of Claim 6 wherein said analog FM demodulator generates an analog FM detect signal that is output to said system selector and wherein said system selector generates said selecting signals based on said analog FM detect signal.

11. The radio receiver of Claim 6 wherein said hybrid/all digital decoder generates a synchronization detect signal that is output to said system selector and wherein said system selector generates said selecting signals based on said synchronization detect signal.

12. The radio receiver of Claim 11 wherein said system selector and said multiplexer select said analog audio signal until said synchronization detect signal is generated and said output of said audio decoding and blending circuit after said synchronization detect signal is generated.

13. The radio receiver of Claim 3 wherein said digital signals are encoded using Orthogonal Frequency Division Modulation (OFDM).

14. A method for operating a digital radio receiver, comprising:
 - receiving FM band signals;
 - simultaneously demodulating said FM band signals to generate analog audio signals and attempting to acquire synchronization of encoded digital audio signals;
 - outputting said analog audio signals until said synchronization is acquired;
 - decoding said FM band signals to generate digital audio signals after synchronization is acquired;
 - generating hybrid digital signals if said synchronization is acquired after said analog audio signals are detected by blending said analog audio signals and said digital audio signals.

15. The method of Claim 14 further comprising converting said FM band signals to digital signals.

16. The method of Claim 14 further comprising:
 - detecting whether said analog audio signals are received;
 - decoding one of said hybrid digital signals and all digital signals if said synchronization is acquired before said analog audio signals are detected;
 - and
 - outputting said one of said hybrid digital signals and said all digital signals.

17. The method of Claim 15 wherein said digital signals are encoded using Orthogonal Frequency Division Modulation (OFDM).

18. A radio receiver for Frequency Modulation (FM) band signals, comprising:

decoding means for attempting to acquire synchronization and for decoding said FM band signals to generate digital audio signals; and

analog FM demodulating means for demodulating said FM band signals to generate analog audio signals,

wherein said analog FM demodulating means generates said analog audio signals while said decoding means simultaneously attempts to acquire synchronization, and wherein said radio receiver outputs said analog audio signals until said synchronization is acquired.

19. The radio receiver of Claim 18 further comprising front end means for receiving said FM band signals.

20. The radio receiver of Claim 19 further comprising converting means for converting said FM band signals to digital signals.

21. The radio receiver of Claim 20 wherein said analog FM demodulating means communicates with an output of said converting means.

22. The radio receiver of Claim 19 wherein said analog FM demodulating means communicates with an output of said front end means.

23. The radio receiver of Claim 20 further comprising:

system selecting means for generating selecting signals;

decoding and blending means that communicates with said decoding means and said analog FM demodulating means for blending said analog audio signals and said digital audio signals during transitions; and

multiplexing means for selecting an output of said decoding and blending means and an output of said analog FM demodulating means based on said selecting signals.

24. The radio receiver of Claim 23 further comprising:

first switching means for switching that is arranged between said converting means and said decoding means; and

second switching means for switching that is arranged between said analog FM demodulating means and said converting means,

wherein said system selecting means controls said first and second switching means.

25. The radio receiver of Claim 18 wherein said decoding means comprises:

synchronizing means for synchronizing with said digital radio signal;
transform means that communicates with an output of said synchronizing means for converting said digital radio signal from a time domain to a frequency domain;

digital FM demodulating means for demodulating an output of said transform means;

deinterleaving means for deinterleaving an output of said digital FM demodulating means;

channel decoding means for decoding channel code in an output of said deinterleaving means; and

descrambling means for descrambling an output of said channel decoding means.

26. The radio receiver of Claim 25 further comprising extract control means for determining when synchronization is acquired and for generating control signals for at least one of said transform means, said digital FM demodulating means, said deinterleaving means, said channel decoding means and said descrambler.

27. The radio receiver of Claim 23 wherein said analog FM demodulating means generates an analog FM detect signal that is output to said system selecting means and wherein said system selecting means generates said selecting signals based on said analog FM detect signal.

28. The radio receiver of Claim 23 wherein said decoding means generates a synchronization detect signal that is output to said system selecting means and wherein said system selecting means generates said selecting signals based on said analog FM detect signal.

29. The radio receiver of Claim 28 wherein said system selecting means and said multiplexing means select said demodulated analog audio signal until said synchronization detect signal is generated and select said output of said decoding and blending means after said synchronization detect signal is acquired.